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ABSTRACT

GRADES OR AGES: Grades 7-9. SUBJECT MATTER: Physical Health, Sensory Perception. ORGANIZATION AND PHYSICAL APPEARANCE: The format consists of four columns: a basic context guide for teachers, a listing of major understandings and fundamental concepts which children can achieve, resource materials for classroom teachers, and supplementary information. OBJECTIVES AND ACTIVITIES: The program aims at educating pupils about sensory perception in order that they may better care for their senses and prevent sensory disorders. INSTRUCTIONAL MATERIALS: Questions and suggestions are provided on the use and misuse of sunglasses. A list of multimedia resources dealing with sensory perception is given. STUDENT ASSESSMENT: No provision is made. OPTIONS: The guide is suggestive only. (JB)

HEALTH CURRICULUM MATERIALS
Grades 7, 8, 9

STRAND I, PHYSICAL HEALTH
SENSORY PERCEPTION

The University of the State of New York/The State Education Department
Bureau of Secondary Curriculum Development/Albany 12224
1970

THE UNIVERSITY OF THE STATE OF NEW YORK
Regents of the University (with years when terms expire)

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FOREWORD

This publication contains curriculum suggestions for teaching Strand I - Physical Health, Sensory Perception, for grades 7, 8, and 9.

The publciation format of four columns is intended to provide teachers with a basic content in the first column; a listing of the major understandings and fundamental concepts which children may achieve, in the second column; and information specifically designed for classroom teachers which should provide them with resource materials, teaching aids, and supplementary information in the third and fourth columns. The comprehensive nature of the health program makes it imperative that teachers gain familiarity with all of the strands presently in print. In this way, important teaching-learning experiences may be developed by cross referring from one strand to another. As a case in point, mental health teachings may include supplementary materials from physical health, sociological health problems, environmental and community health, and education for survival.

It is recommended that the health coordinator in each school system review these materials carefully and consult with teachers, administrators, and leaders of interested parent groups in order to determine the most appropriate manner in which to utilize this strand as an integral part of a locally adapted, broad, and comprehensive program in health education.

The curriculum materials presented here are in tentative form and are subject to modification in content and sequence. Critiques of the format, content, and sequence are welcomed.

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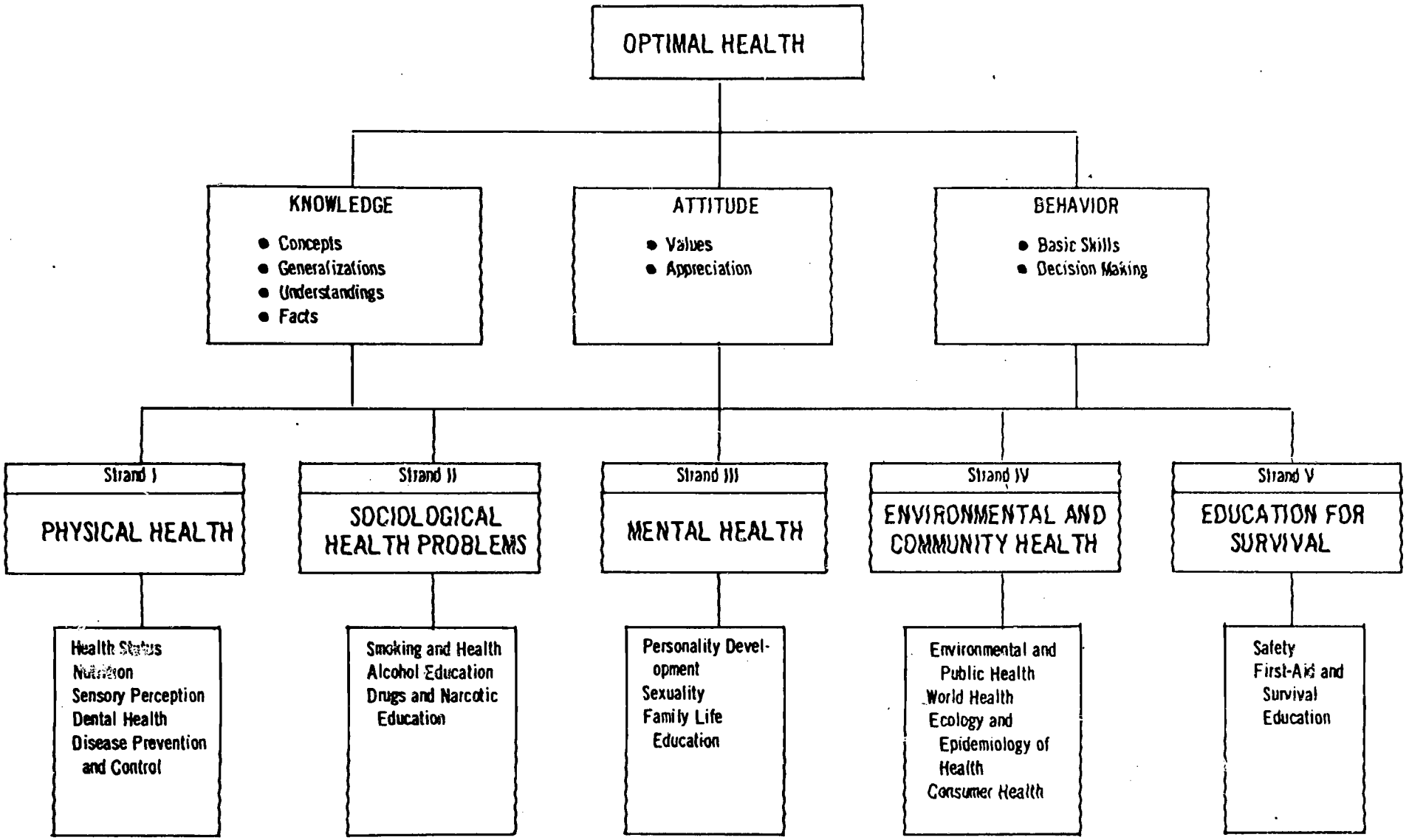
OPTIMAL HEALTH
KNOWLEDGE
• Concepts
• Generalizations
• Understandings
• Facts
ATTITUDE
• Values
• Appreciation
BEHAVIOR
• Basic Skills
• Decision Making
Strand I
PHYSICAL HEALTH
Health Status
Nutrition
Sensory Perception
Dental Health
Disease Prevention and Control
Strand II
SOCIOLOGICAL HEALTH PROBLEMS
Smoking and Health
Alcohol Education
Drugs and Narcotic Education
Strand III
MENTAL HEALTH
Personality Development
Sexuality
Family Life Education
Strand IV
ENVIRONMENTAL AND COMMUNITY HEALTH
Environmental and Public Health
World Health
Ecology and Epidemiology of Health
Consumer Health
Strand V
EDUCATION FOR SURVIVAL
Safety
First-Aid and Survival Education

CONTENTS

OVERVIEW

The widespread prevalence of preventable sensory disorders indicates the urgent need for adolescents to become familiar with the nature of the senses and perception. Adolescents need to understand (1) how to care for their senses, and (2) the procedures used for prevention, treatment, and rehabilitation of perceptual disorders.

Students in grades 7, 8, and 9 should develop the following basic concepts as fundamental to an understanding of sensory perception:

1. The sense organs are the anatomical structures which receive stimuli from the environment.
2. Sensory perception is the interpretation of the stimuli received.
3. Sensation takes place in the receptors while perception takes place in the appropriate centers of the brain.
4. Sensation is primarily our reactions to some relatively simple form of stimulation; e.g., color, and perception is usually related to complex patterns of stimuli rather than to an individual stimulus element.

Human efficiency depends upon accurate perception. The degree to which man can correctly interpret his environment is directly related to his ability to respond appropriately. The material in this substrand is closely related to the adolescent's concern with his changing body and his increasing awareness of others. Specifically, it deals with the individual's responsibility for proper care of his senses of sight, sound, touch, smell, taste, and body position.

OUTCOMES

Students in grades 7, 8, and 9 should:

1. Develop insight into the nature of visual acuity.
2. Become familiar with the common visual disorders, their detection and correction.
3. Develop an understanding of the relationship between sound and hearing; light and vision, and other stimuli to perception.
4. Develop an appreciation of how well one perceives is related to effective living.
5. Practice proper care of all the senses.
6. Acquire an understanding of the types, degrees and significance of perceptual disorders.
7. Learn to appreciate some of the current research and techniques available to alleviate causes of perceptual disorders.
8. Become aware of the medical and nonmedical personnel and services available to assist the individual with perceptual problems.

OUTLINE OF CONTENT	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES	SUPPLEMENTARY INFORMATION FOR TEACHERS
I. Vision in Sensory Perception	Sensory perception occurs in the visual center of the brain. It is the way a person interprets the visual stimuli. The eye is the body's organ which receives visual stimuli to be transmitted to the visual center of the brain.	Distinguish between seeing and perceiving. Show the film "Sensory Perception" available through the Syracuse University Film Library. Why do people sometimes see things differently? What factors are likely to be associated with the accuracy of our perception?	The teacher may wish to discuss some of the key tissues of the eye and related structures which make vision possible. It is well to relate discussions of anatomy to the concepts being taught, rather than to merely memorize the structures. A basic understanding of how vision takes place may be enhanced by some reference to the anatomy and physiology of the eye, however, reviewing what students have learned in science.
A. Visual development	The visual process is accomplished through: . The hereditary potentials which control vision . Learning what to see, how to see, and perception	Have students observe some common objects: a flower, a picture, and a pencil. Describe what they see: . color . relationships of parts . size . regularities, etc. Are the descriptions alike? Why are there some differences?	
	It is possible, through training, to improve one's perception or ability to observe events more accurately.	Place some common objects in a box. Such things as a pin, paper clip, etc. Have each student look into the box for 30 seconds. Ask students: . How many paper clips did you see? . Was the pin opened?	

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		Ask some questions about things which did not exist in the box. Compare accuracies. Discuss: Why do some people see things others don't? In regard to questions relative to things that did not exist in the box, did some students think they saw these from the suggestion of the question? Why?	
B. Visual perception	We tend to organize what we see into what we want to see rather than the actual image on the retina.	How does each of the factors affecting perception influence perception?	We choose to see what interests us and this is based on all of our past experiences. We also tend to see the world as others see it because the human being is susceptible to suggestion.
1. Factors affecting perception	What is seen by each individual depends on the: . Specific condition of his eye . His emotional state . His socioeconomic background . His intellectual ability and education . The specific situation	How does the angle at which we see affect our perception? How does hunger or thirst affect our vision? Our perception? Explain how training (such as an artist) influences what we see.	Learning influences what we perceive. Perception usually relates behavior to complex patterns of stimuli rather than to an individual stimulus element. We tend, therefore, to organize all stimuli into organizational patterns, namely:

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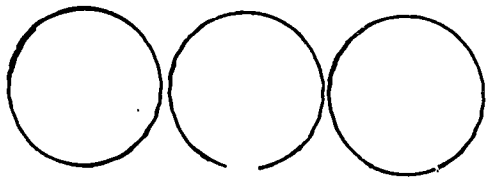
			. figure and ground . grouping . similarity . nearness . continuity (closure) . constancy Principles of perception include the following related to grouping: . Nearness: things which are perceived together. . Similarity: things which are likely to be perceived as a part of a common group. The closure principle is the tendency to complete a figure which is incomplete. We see objects standing out against their background rather than the background itself. A figure must have some contrast with its background in order to be seen. Example of circles:
		Show students a drawing of several circles, but with one or more not quite closed. Ask what figures are represented. The answer should be, "circles."	 The same can be done with other geometric figures.

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		Point out that one is not a circle, but that we use the closure principle in making them all circles. How do artists take advantage of this phenomenon?	See Julesz, Bela. "Experiment in Perception." Psychology Today 2: 16 (July 1968). This article provides valuable background for the teacher and may be adapted for use with advanced junior high school students. We see things as always being the same even when in actuality the object, as viewed by us, is different. There is size, color, brightness, shape, and depth constancy.
2. Illusions	False perceptions are called illusions. If we organize physical stimulation erroneously and perceive our physical environment as something contrary to reality, it is an illusion.	Have students experience illusions by reproducing (on visuals or ditto) some of the common ones mentioned in the bibliography. Students may wish to try to develop examples of their own. Explain how illusions are possible.	An illusion can be conceived of as representing a discrepancy between physical and psychological measurements. Illusions may include any of the following: . illusions of shape and size . illusions of brightness . illusions of movement Refer to Ruch, Psychology and Life; or Kendler, Basic Psychology, for illustrations and explanations of these perceptual phenomena.
C. Visual acuity	Visual acuity is the ability to distinguish fine detail. It means keeness of sight.	Distinguish between visual acuity and visibility.	Visual acuity means how the eye sees. The normal eye can see the equivalent of a wire ½-inch in diameter at a distance of 440 yards.

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	Many factors affect visual acuity, even in normal vision. These factors include: . angle of retinal stimulation . light intensity . distance to the object to be seen . time of retinal stimulus . contrast with other nearby object or background.	Set up situations to test the factors which affect acuity. Have students experience these and describe their experiences. A field trip to an opticians, ophthalmologists, an optometrists office may be arranged for small groups of students to learn how acuity is measured and corrected.	Details of objects straight ahead are very sharp, but they become less clear proceeding out from the center. Visual acuity decreases at night or in darkness, as objects are moved farther away from, or closer to normal vision distance, and as contrasts become less apparent. A glare that shines with a harsh uncomfortably brilliant light interferes with clear vision and causes eye fatigue. For example, when direct sunlight reflects from a printed page, the iris reacts to the light by contracting and reduces the visibility of the object being studied. Eye fatigue results because of the necessary action of the muscles that control the amount of light that enters the eye. Glare also affects the retina. When there is an increased amount of light the iris constricts so that the pupil becomes smaller and visual acuity is brought into a sharper focus.

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1. Measurement of acuity	The Snellen Chart is one of the most common devices for measuring the visual acuity of individuals.	Have the school nurse-teacher come to class to demonstrate the use of the Snellen Chart. What are some of its limitations? What is its main function?	On the Snellen Chart, each line of letters is numbered to indicate the standard distance at which an individual with normal sight should be able to read. A person who can identify the letters on the 20-foot line at 20 feet from the chart is said to have normal visual acuity, 20/20 vision. A person with 20/15 vision can read [illegible] 20-foot line what [illegible] read at the 15-[illegible]. A person with 20/[illegible] would be reading at the [illegible]ot line what most people [illegible]e able to read at the 30-[illegible] line. The top figure of the fraction indicates the distance from the chart; and the bottom figure shows the line the individual was able to read.
2. Retina	The light-sensitive retina lines about two-thirds of the back part of the internal eyeball. The retina is essential for vision to take place.	Why is the retina essential to vision? Show the film "How the Eye Functions."	Imbedded in the retina are two different types of light-sensitive structures or receptors called rods and cones. Rods are more sensitive to light than are cones.
3. Blindspot	The "blind spot" represents a lack of neural sensitivity at that point where the optic nerve connects with the retina.	Demonstrate the blindspot and have each student find his blindspot.	There is no vision where the optic nerve enters the eyeball. This produces the blindspot. The blindspot is not a problem to the two-eyed person, because the individual sees

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		Reference: Lawrence, Clemensen, and Burnett. Your Health and Safety, 5th ed. p.287. Harcourt, Brace and World.	with the peripheral field of the other eye. The blindspot may become a problem for a short period of time to an individual who has lost one eye - until he learns to compensate. Some diseases (glaucoma) cause an increase in the size of the blindspot.
D. Eye defects	The normal eye brings parallel rays of light focus on the retina.	Make a list of common eye defects - distinguish between these which are due to structure defects and those due to disease.	
1. Refractive errors	Refractive errors are defects of vision that are caused by irregularity of the size or shape of the eyeball, lens, or cornea. They include myopia and hyperopia. Eye glasses are worn to correct refractive errors. They do not cure the error.	Use drawings to illustrate normal, myopic, hyperopic eyes. For illustrations, refer to Diehl et al. Health and Safety for You, 2nd ed. p.227 or Lawrence, et al Your Health and Safety 5 ed. p.292 or Otto, et al, Modern Health, p.178. A student report on the history of spectacles will indicate the great strides that have been made since the inception of the idea. Today's Health of March, 1969 has an article, "Focus on Spectacles," that the	Refraction is the bending of light. If the shape of one or more parts of the eye is faulty the light image is distorted. These are the refractive errors. There are very few perfect eyes. There are usually differences between the two eyes so that one needs greater correction than the other. Wearing eye glasses does not weaken the eyes. Eye glasses do not cure the error in the sense that the error remains when the eye glasses are removed. It is only during the time the glasses are worn that the error is corrected.

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		student could use for reference.	
a. Myopia (nearsightedness)	The myopic persons sees distant objects out of focus. Myopia is an elongated eye that is caused by heredity, disease, and growth. Myopia should be treated since it may affect one's effectiveness as a person.	Show the film "Your Eyes." Does a local eye specialist have a collection of corrective lenses that may be brought to school to be discussed and studied. What kind of history does the development of eyeglasses have? Make a list of factors in one's life which may be influenced by refractive errors.	Refer to the grades 4, 5, 6 curriculum materials regarding myopia and hyperopia. Myopia may be associated with systemic disorders of the body; i.e., diabetes. Myopia may not manifest itself until the child is about 8 years of age, may continue to increase until the early or middle twenties, and stabilize itself after the age that completed growth is attained.
b. Hyperopia	A person with hyperopia sees distant objects clearly but near vision may be indistinct. Eye specialists do not always find it necessary to prescribe eyeglasses for hyperopic individuals.	Distinguish between the varying kinds of refractive errors. Which are most common among young people? Why? Do eye defects affect one's personality? Explain. (See Strand III - Mental Health.) Do eye exercises cure eye defects? Explain.	The continual change in the developing process accounts for the frequent change of glasses needed by the child as he is growing up. The specific cause of myopia is unknown; however, it is thought to be related to a hereditary tendency and/or structural development. Prompt treatment is important, since uncorrected myopia may affect one's interpersonal relationships, school performance, and other dimensions of his life.

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		Have students analyze the specific kinds of errors in judgement which might be made while driving a car by people with different types of uncorrected refractive errors.	An example of an effect of hyperopia or myopia on a child's personality: A child that cannot see the board in school may repeatedly fail tests. The constant failure may make him lose interest in school and consequently become very withdrawn. Research has shown that eye exercises may help the person to know what the blurred objects are by experience, but the refractive error itself is not improved.
c. Presbyopia	Presbyopia is the result of the eye lens becoming less elastic with age. This is a visual problem common in people over 40 years of age.	How is presbyopia similar to hyperopia? Explain how they differ.	Usually eyeglasses are prescribed to enable the person to see more clearly objects at a close distance. Biofocals are frequently preferred.
d. Astigmatism	In astigmatism either the lens or cornea or both are out of shape.	Demonstrate astigmatism by referring to Lawrence, et al, Your Health and Safety, 5th ed. p.293.	This is the most common type of refractive error. The uneven cornea or lens cannot bring all light rays into focus at the same spot. The person sees one part of the object well while the other parts are blurred. The eye specialist prescribes cylindrical lenses for the correction of astigmatism.

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2. Strabismus	Strabismus is the inability to attain binocular vision. The main characteristics of strabismus are: . the eyes seem to look inward . the eyes do not focus on the same object . two of the eye muscles are not balanced. One pulls harder than its antagonist.	Why should strabismus be under the supervision of an ophthalmologist? Describe how blindness in one eye may result from untreated strabismus.	There seems to be a hereditary tendency to strabismus. Some of the known causes of strabismus include: faulty insertion of eye muscles, overactivity or underactivity of the muscles that control eye movements, pressure on the eye, paralysis or spasms of the eye muscles. Early treatment is important to prevent the loss of sight in the weak eye. Treatment may involve one or more of the following procedures: special glasses, wearing a patch over the good eye, eye exercises, and surgery.
E. Corrective lenses	Prescription lenses are ground to the specifications of a specialist and are worn to aid or improve vision.	Some students may like to do a study of the evolution of eyeglasses. Invite to class an optician or optometrist to discuss and demonstrate the evolution of corrective lenses.	The U.S. National Health Service indicated that more than 86 million Americans wear eyeglasses of one kind or another.
1. Eyeglasses	Eyeglasses should be prescribed by either an optometrist or ophthalmologist.	Describe conditions under which each kind of lens may be most useful or helpful. What advantages does one kind of lens have over others?	The various kinds of eyeglasses may include: . convex or concave lenses . bifocal lenses which have two refracting powers, one for near vision and one for distant vision . trifocal lenses which have three refracting powers, one for near vision, intermediate

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		Compare lenses with each other and relate to the refractive errors that may be used to correct. Identify the types of lenses owned by students in the class.	vision and distant vision . cylindrical lenses which are generally prescribed for astigmatism . contact lenses which are made of plastic, fit over the eyeball and under the eyelid, and are held in place by surface tension
2. Contact lenses	There are several different kinds of contact lenses which include (1) scleral, and (2) corneal. The corneal lens which fits over the pupil and iris and is in contact with the cornea is the most popular type of contact lens.	What kinds of eye conditions would prohibit the use of contact lenses? Why? What is a keratometer? Discuss why one kind of contact lens should be more popular than another. List occupations in which contact lenses would be a necessity; and advantage. Discuss: What factors should enter into a persons' decision to obtain contact lenses? Invite an ophthalmologist to class to discuss: . the various kinds of eye examinations - their purposes, etc. . or demonstrate the kinds and uses of the various lenses	The idea of contact lenses was conceived by Leonardo da Vinci in the early 16th century. In the 1880's European lens makers were fitting large half shell glass lenses over the entire eye. Today about 8 million Americans own contact lenses, but not all of them wear them regularly. Some people find them unsatisfactory for one reason or another after they have been purchased. Scleral lenses were the first type to be used. Scleral lenses fit over the eye including not only the cornea but some of the sclera (white of eye) as well. The corneal type lens became possible in 1948 with the advent of the plastic lens. The corneal lenses are only about 4/100 of an inch in thickness and no larger in diameter than a dime.

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		Find out how the contact lens stays put - what keeps it in place. Read "A Close Look at Contact Lenses." by Michael Michaelson. Today's Health, December 1968 p.24.	
3. Sunglasses	Any corrective lens may be tinted. Sunglasses may be prescribed or "over the counter." Care should be taken in the selection of sunglasses.	Why do people buy tinted glasses? What are some dangers in buying sunglasses over the counter? Who wears sunglasses? Why? What is photophobism? Is it dangerous?	See Appendix for a further discussion of sunglasses. The inability to tolerate light is often a sign that something is wrong. Severe vitamin deficiencies and diseases of the eye may be manifested as photophobia.
F. Diseases of the eye	Eye diseases may be either acute or chronic, infectious or noninfectious.	Refer to Strand I - Disease Prevention and Control. How do the principles of disease discussed in this strand apply to eye diseases?	
1. Conjunctivitis	Conjunctivitis (inflamation of the eye) may be infectious or noninfectious depending upon the causative agent.	What is conjunctivitis? What forms does it take?	Noninfectious conjunctivitis may be the result of: . prolonged exposure to lights . irritants such as smoke, dust, etc

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	A red eye is a sign that something is wrong and an eye specialist should be consulted.	What general health conditions or practices affect eye health? How?	. respiratory infections . allergies Acute infectious conjunctivitis is the result of invasion of the conjunctiva by pathogenic microorganisms. One type is commonly referred to as "pink-eye" and is considered highly contagious. It is transmitted from one person to another through the discharges of the eye or upper respiratory tract and through contact with contaminated articles from the infected person. For this reason, the use of personal articles should not be shared.
2. Other common diseases of the eye	Some of the common diseases of the eye are: . trachoma . styes . glaucoma . cataract	Distinguish between each of the various kinds of eye diseases relative to: . cause . prevention . nature and dangers to vision Read the following: . "Cataracts - fact and fancy." Bulletin from The National Society for the Prevention of Blindness. 1961. . "Cataracts: The fog that blinds" by Roy O. Scholz. Today's Health. January 1961.	Trachoma is a viral disease of the eyes that is a leading cause of blindness in many areas of the world. It is associated with poor nutrition, hygiene, and sanitary conditions. A stye is an infection of a hair follicle. Frequent styes may be an indication of poor general health. Glaucoma is a noninfectious disease of the eye that is the leading cause of blindness in the United States.

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		Discuss: glaucoma is a greater eye problem in the U.S. than in underdeveloped nations?	Glaucoma most often occurs in people over 40 years of age. It is characterized by increased pressure within the eye. The increased pressure may lead to destruction of the retina and optic nerve, resulting in blindness.
	Early detection and treatment of glaucoma is essential for reducing the toll of blindness as a result of this disease.	Find out: glaucoma is detected. What are the general signs of early glaucoma? How does acute glaucoma compare with chronic?	Glaucoma can not be cured, but it can be controlled. When detected early, progress of the disease can be slowed or stopped through drugs or surgery.
	Have students poll their parents to find out how many have been tested for glaucoma.	Have students investigate glaucoma - screening programs in the community (the local health department is a good resourse).	
	The etiology of cataract is not always known, but in every case, all or part of the lens becomes opaque.	What is traucoma? Investigate the methods used in treating cataracts.	Cataract is not a growth but a cloudiness of the lens. The specific cause of cataract is unknown. In two-thirds of all cataract cases even the specific predisposing factor is unknown. One-third of the cases include the known predisposing factors of eye injury, glaucoma, or prenatal exposure to German measles in the first trimester of pregnacy. Cataracts have also been associated with senility and diabetes. Read the article "Eye Injuries" by Carl Pothoff *Today's Health*. March 1957.

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G. Common injuries to the eye	The leading cause of loss of sight among adolescents is injury to one or both eyes.	List those things most likely to damage the eye to cause partial or complete loss of sight. Make a list of things teenagers may do to help lessen eye injuries to themselves, to others. Discuss: What should parents do to protect their children's eyes?	Injury to the eyes of children and youth are caused by factors which may be classed as: . mechanical in nature . chamical in nature . explosive in nature . a combination of the above See Appendix
H. Blindness	A person is considered visually handicapped if he measures 20/70 in the good eye after correction.	Read: "The Story of My Life" by Helen Keller (N.Y.: Doubleday, Doran, & Co. 1938)	When someone is said to be blind the average person thinks he has no sight at all. This is not so according to the legal definitions of blindness. Acuity "blindness" - less than 20/200 in the better eye after correction. Field of vision "blindness" - loss of 80 percent of visual field. If a person looks straight ahead and can see only a maximum angular diameter of 20° (called tunnel vision) he is considered legally blind - even if he has 20/20 vision in his limited field of vision.
	The rate of blindness in the U.S. has gone down, but the total number of persons who	Have students look up programs regarding the blind. For example: the social	There are 10 million blind people in the world with 2 million of them in India.

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	are blind has increased because of our increased life expectancy rate.	security laws, state schools for the blind, and the role of the State Education Department in vision conservation.	There are approximately 340,000 blind in the U.S. Distribution of blind population according to age in U.S.: under 5 years .5% 5-19 years 3.7% 20-59 years 33.1% 60 and up 62.7%
	There has been a decrease in blindness due to infectious diseases and injuries over the past 30 years.	Discuss: What medical practice has decreased the incidence of blindness from infectious diseases?	In early 1900's, 28 percent of blindness of the newborn was caused by gonorrhea of the mother. Today only 1 percent new born blindness is the result of this disease. The decrease is largely due to the now routine practice of putting a few drops of silver nitrate solution into the newborns' eyes immediately after delivery. This protects against damage even if the mother should have the disease.
		What kinds of considerations are given to the blind by governments? How have programs for the blind changed over the past 30 years? Why? What further, needs to be done?	

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I. Visual discrimination	The basic discriminations of visual experience are concerned with hue, brightness and saturation.	Distinguish between hue, brightness, and color.	Hues are the colors in the visual spectrum. Brightness is based on the colors that are closest to white. Lack of brightness are those colors close to black. Saturation is the most difficult concept. A completely saturated color is one without any white.
	The production of visual purple is necessary to see in a dim light. Vitamin A is essential for the production of visual purple.	Conduct an experiment to demonstrate the lack of color at the edge of the visual field. Hold a colored pencil at the ear and slowly bring it forward while eyes are straight ahead. At first the object will appear colorless, but as it approaches the center of the visual field it takes on color. Experiment: Have students draw a red circle on a plain piece of paper. Near by on the same piece of paper color in a gray rectangle. Students first stare at the red circle then look immediately at the gray rectangle. The student will see a green circle against the rectangle.	Colors are classified as chromatic and achromatic. Chromatic colors are the reds, blues, oranges, purples, etc. The achromatic colors are the whites, blacks, and grays. The cones of the retina account for both chromatic and achromatic colors. The rods of the retina see only achromatic colors. At the edge of the visual field there are only rods so the person does not see color. This effect is the result of the negative after image. After staring at a particular color and then at a gray rectangle, a person usually sees a circle inside the rectangle of the complementary color.

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	Color blindness may range from a color weakness to total color blindness.	Discuss: Why should one be aware of his color vision.	A person may have a color weakness and never be aware of it unless put to some exacting color chore. Complete color blindness is rare. It is usually in albinos when it does occur. Red-green defectives are the most common type. Blue-yellow is the next most common type. About 4 percent of the population suffer from an inherited form of color blindness called dichromatism. It is more common in males. (Recall the grades 4 - 6 unit --one in 25 males and one in 200 females suffer from color blindness.)
J. Eye specialists	Qualified eye specialists should be consulted about any eye problems.	Compare eye specialists regarding training, qualifications, and so on. Make a list of occupations which deal in some way with the eyes. Include those related to safety, as well as, those who treat eye problems.	The eye specialists are listed and described in Strand IV, Consumer Health, Grades 4, 5, 6.
K. General care of the eyes	In normal situations eyes that are healthy do not need special care because of the natural protection they have.	List the natural protective structures and their functions.	The protective structures: . The eyeball is protected by being situated in a bony structure.

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	Regular use of eyewash medications is not a recommended practice.	How does nature take care of cleaning the eye without eyedrops or eyewash? Why or how can eyewash be harmful to the eye? Should first aiders use eyewash? Explain. See Strand V for detailed discussion of first aid for eye injuries.	. Eyelids, with the help of the nervous system, protect the eye with the blinking reflex. . Eyelashes screen the eye from dust and insects. . Tear glands "cry" all of the time; tears flowing from the tear ducts wash the eye. . The conjunctiva protects the eye by covering the eyeball and the inner surface of the eyelids.
II. Hearing and Sound	Hearing, like vision, helps us to keep in touch with what is happening in our environment. The effective stimuli for auditory sensations are sound waves. The ear is the structure which receives the sound waves. Sound is perceived in the auditory center of the brain.	Compare the superiority of vision to hearing regarding: . Locating the environment stimulus. . Identifying the stimulus. Have students investigate the relative importance of the senses of hearing and seeing for various species of animals. List those things that can be identified by sound only. List those things that can be identified by sight only.	We can locate things in the visual world much more accurately than we can in the auditory world. Even though hearing may be less effective it plays a most vital role in perception and communication. For example, it helps us to organize our environment (as in listening to music) and, most importantly, it makes communication with others more effective. Hearing is apparently a late development in the evolutionary process. It is intricately involved with the human ability to speak. We hear not only words, but the tone of voice.

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		List those things which need both sight and sound for complete and accurate identification and appreciation. How would one's life be changed without the sense of hearing? How would one need to change to adapt himself to a life without sound?	Sound travels the pathways of the auditory nerves to both cerebral hemispheres. It goes first to the thalamus and from there to the cortex of the temporal lobes.
		List the physical attributes of sound. How are they related to hearing?	The receptors for hearing are the hair cells of the Organ of Corti and they are stimulated only when moved by vibrations of the basilar membrane. The cochlea (coiled tube) contains the Organ of Corti. It is lined with many fine hairs which are arranged like keys in a key board. The shorter, thinner hairs pick up high sounds. The longer, thicker hairs respond to low sounds. The auditory nerve gets the message from these hairs and sends them to the brain.
A. Sound	Sound requires a medium through which to travel.	Demonstrate how sound travels through several different mediums: air liquid, and solid. Which seems to be the most	The teacher is referred to high school physics texts for a complete discussion of sound. Sound as it applies to the psychology of hearing
1. Sources and transmission	Sounds are vibrations transmitted through a material medium.		

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		efficient medium for the conduction of sound?	is discussed in most college basic psychology texts. For example, Kendler, H.H., *Basic Psychology*, or Ruch, F., *Psychology and Life*. Sound moves through the air at a speed of about 760 miles per hour at sea level. It travels about four times faster in water and much faster than that in solids.
2. Loudness and pitch	Sound is measured in terms of decibels (loudness) and frequencies (pitch).	Invite the school nurse-teacher or the hearing and speech teacher to class to discuss hearing, sound, and levels of noise tolerance. A demonstration of testing equipment for hearing should be given.	The common measure of sound intensity is the bel, named for Alexander Graham Bell, the inventor of the telephone. Intensity is usually given in terms of decibels, which is one-tenth of a bel. The human ear can tolerate sounds up to 120 decibels. This is considered the level of discomfort.
	An audiometer is an instrument that measures a person's ability to hear.	Have a committee of four or five students do research on sound and how it is related to hearing. They may get their information from the library, the science teacher or from community sources. Have them report their findings to the class. Demonstrate sound, its variations, measurements, and control.	When testing people with an audiometer, sounds of different pitches are given until a certain pitch cannot be heard. Then the loudness of that pitch is increased until that pitch can be heard. From this type of testing an audiogram is made. The audiogram is a graph depicting a person's hearing acuity.

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3. Hazards from loud sound	Long exposure to noise at high decibel measure may cause permanent damage to hearing.	How can noise harm hearing? Determine what level of sound is produced by the amplifiers of a modern band. Would the level be sufficiently high enough to cause hearing loss?	The threshold point is when the intensity of the stimulus just barely elicits a sensation. An individual's hearing threshold is defined as the lowest sensation level at which he can detect the presence of the test tone. The frequencies (pitch) heard by the human ear are complex. Generally more than one frequency is heard at the same time. Pure tone in nature is as rare as pure color. The flute comes closest to emitting a pure tone.
4. Locating the source of sound	Two ears, one located on each side of the head, make it possible to determine the direction of sound.	Perform the following simple test: Blindfold a student and have him sit in the middle of the room. Walk about making sounds (use a pitch pipe, tuning fork, or your own voice) varying in loudness and pitch. The student should point to the direction of the sound. What happens when the sound is directly in front of or directly behind the student? Why?	A sound from the same source seldom reaches both ears at the same time. For example: a sound coming from a source to the right will enter the right ear first then go around to enter the left ear. By an intricate process in the brain, the differentiation in the time sequence between the two sounds enables us to locate sound. Some animals can swivel their ears to locate the source of sound.

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		What are some instances in modern life where location of sound may be a matter of life or death?	
B. Equilibrium	The ear is an organ for maintaining balance, as well as for hearing. The equilibratory sense is responsible for the orientation of the body in space. If position is changed too rapidly a person may become dizzy and nauseated. The sense organs responsible for the equilibratory sense are the semicircular canals and the vestibular sacs.	Have students investigate: How is position, balance, and equilibrium affected by space travel? Weightlessness? What organs control equilibium? How?	If a person is born with a defect in the semicircular canals, he may have great difficulty with balance. This may have an effect on his ability to learn to walk. The ear helps the individual to maintain his equilibrium. In addition to the effects of actual motion, visual impressions of moving objects that increase ones' sense of the lack of equilibrium may also be responsible for motion sickness. Drugs are available through a physician for people who suffer from motion sickness. Because such drugs may have side effects, their use should be supervised.
C. Auditory discrimination	Since background, environment, and experience determine how some sounds are interpreted, different individuals may perceive the same sound in different ways.	Bring records of various kinds of music to class. Ask the students to write their reactions to each type of music.	Some adults may find young people's modern music grating to their ears. Young people may not actively dislike the music of their parent's generation, but simply may not have learned to enjoy it.

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	Some kinds of noises are objectionable or irritating to most people because of their inappropriateness or because of interference.	Why do some students like some music while others dislike it? Do students enjoy "modern" music more than that of a generation ago? Why?	The sound of a nearby passing train may not disturb the person who is alone, but if that person wishes to speak with someone the sound may be annoying.
	Many sounds are pleasant or annoying because of: . the psychological situation in which they occur . what an individual has learned to enjoy . the psychological and physiological effects of the sound (its association to the individual)	Have the class make a list of sounds which may be pleasant under one condition but annoying under another condition. What factors make sounds pleasant or annoying?	Some sounds are irritating in themselves, regardless of circumstance, because the ear is particularly sensitive to such high pitched tones. Some sounds are not irritating if soft, but are very irritating as they become louder.
	Our auditory sensitivity changes as we grow older.	Do we learn to "hear" or appreciate sounds? Explain. Why do some people require a hearing aid before 40 years of age, while others may never need one?	Normal hearing is amazingly sensitive. It is fortunate that our hearing is not more so. We are most sensitive to tones between 2000 and 4000 cycles per second. A hi fi set is capable of reproducing sounds closely resembling the original sound. As they grow older, most people can expect to suffer, a progressive hearing loss of 500 cycles and above. However, one cannot estimate very accurately how great his hearing loss will be as he grows older, because hearing ability for individuals of the same age varies greatly.

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D. Hearing problems	Hearing may be impaired as a result of one or more of the following: . infection . mechanical injury . degeneration . excessive use of alcohol or certain drugs . loud noise	Have students investigate: What are the antinoise laws in your community? Are they enforced?	One out of 20 Americans has some hearing loss. About 3 million Americans have such poor hearing they need special education and medical care. There are approximately 300,000 deaf persons in our country. Antinoise laws are ancient. In 720 BC the city of Syboris had a zoning ordinance to isolate the residential sections from the industrial areas. In the first century BC, Julius Caesar banned chariots from the streets of Rome at night. Today in Tubingen, Germany, it is against the law to play a portable radio or musical instrument in public streets or squares.
	Most large cities have ordinances against excessive noise, but they often are not enforced.	Differentiate between city and country noises. Why does a city person visiting the country sometimes have difficulty sleeping? Discuss the reverse of this situation. Is this a kind of pollution? Explain. Compare with other pollutants in our environment.	Dr. Samuel Rosen of New York City's Mt. Sinai Hospital has studied the hearing acuity of a tribe called the Mabaams. The Mabaams lead a quiet life. The background noise in one of their villages is about one-tenth as loud as the hum of a refrigerator. Their hearing is the sharpest ever recorded. Dr. Rosen concluded that modern living noises have a deleterious effect on our hearing.

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	Sudden loud noises can cause a rupture of the eardrum and subsequent loss of hearing.	How can the ears be protected from sudden loud noises? Find out: What is meant by "noise pollution?" What is being done to alleviate noise from aircraft? City noises? Industrial noises? Home noises?	Astronauts have to be protected against the noise of the blast off. If they were not, their eardrums would burst, convulsions or even death could occur. Experiments are being carried out to solve the problem of jet noise by: . subduing it at its source . changing the flight paths of jets . using protective ear plugs for those people living near the terminals
1. Hearing loss	Hearing loss may be defined or classified in terms of (1) cause, or (2) the extent of impairment.	Have students distinguish between: . hard of hearing . deafness . hearing loss	Normal hearing is defined as the ability of the person to detect a sound with an intensity as low as 15 decibels. Total deafness is defined as the sound that cannot be heard at less than an average of 82 decibels in speech frequencies.
2. Deafness	Deafness is a condition in which the sense of hearing is nonfunctional for the ordinary purposes of life and living.	Why is the sense of hearing so important to a baby? Discuss: What effect will the newly developed rubella vaccine have on the incidence of congenital blindness and deafness?	Children may be born deaf as a result of hereditary defects or congenital causes such as syphilis, or German measles (rubella) of the mother in the first 3 months of her pregnancy.

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		Find out: What is the legal definition of "deafness?"	
3. Hard-of-hearing	Hard-of-hearing is the condition in which the sense of hearing is functional with increased volume or assistance from a hearing aid.	What are some childhood diseases which may cause a hearing loss? Compare the various kinds of hearing loss as to: . degree or seriousness . causes . prevention . treatment or correction . significant research Have students make a list of the "conductive" parts of the ear and describe their part in hearing.	The hard-of-hearing are those whose hearing ability is functional with the assistance provided by a hearing aid. Since learning to speak is dependent on one's ability to hear, the congenitally deaf may have difficulties learning to speak.
4. Psychogenic	Psychogenic hearing loss results from severe emotional problems.	Refer to Strand III, Mental Health, grades 10, 11, 12. Compare this with other funcational psychophysiologic disorders.	Psychogenic hearing loss is also called hysterical or functional deafness. Sometimes it is difficult to determine whether the cause is physical or mental. This kind of hearing loss results from emotional problems which manifests itself in apparent deafness. There is, however, no actual physical damage to the ear or auditory centers of the brain.

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E. Aids for the hard-of-hearing and the deaf	The type and extent of hearing loss will determine the aid to hearing which is needed. These aids include: . lip reading . hearing aids (devices) . hand alphabet	Invite the speech teacher or speech therapist to class to discuss lip-reading and how those who hear can assist the hard-of-hearing. Invite an otologist and audiologist to class to demonstrate the types and uses of hearing aids. Have students roll up a piece of paper in the shape of a funnel and listen through it - like the old ear trumpet.	Since many deaf and hard of hearing individuals learn to read lips, it is important to face the deaf person while speaking. Hearing aids should be purchased by prescription only because each individual case is different, and hearing aids are not helpful to some deaf people. In addition, prescriptions help prevent victimization by frauds and quacks. There are two basic types of hearing aids - air conduction and bone conduction, and the type used should be recommended by a competent professional. Air conduction hearing aids send sound through the normal route but with amplification. Bone conduction hearing aids send sound to the inner ear via the mastoid bone.
F. Ear specialists	Among the medical and nonmedical practitioners who have special training in conditions of the ears and hearing are: . otorhinolaryngologist . otologist, and . audiologist	Compare the training, qualifications and limitations of the various "ear specialists."	The otorhinolaryngologist is a M.D. who specializes in the care of the ear, nose, and throat by both surgical and nonsurgical means.

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		Which specialist would not be consulted for an ear infection? An earache? Under what circumstances would the audiologist be consulted?	The otologist is the medical practitioner who specializes in the surgical and non-surgical treatment of ear disorders. The audiologist is a non-medical technician who specializes in the identification, measurement of hearing loss, and rehabilitation of those with hearing impairments.
G. General care of the eyes	A cold or other upper respiratory disease can spread an infection to the ears.	Demonstrate the proper procedure for blowing the nose. How may infection of the respiratory track spread to the ears?	The nose should be blown gently with both nostrils open to prevent forcing the infection into the eustachian tubes.
	One should consult a physician when an earache occurs because earache is usually symptomatic of infection.	Discuss: why may an earache be important?	
	The normal accumulation of wax in the external ear may be removed with a washcloth. Keep objects such as bobby pins out of the ear. Never put eardrops in an	What kind of hearing loss does impacted wax cause? How should wax be removed from the ear? Why should objects be kept out of the ears?	The glands that produce wax are in the auditory canal. The wax protects the ear against insects and infection. Attempting to remove impacted wax with a hair pin, tooth pick, or other sharp object may push the wax back into the ear or the implement may injure the ear.

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	ear that is discharging fluid unless told to do so by a physician. Avoid careless play that may cause a blow to the ear. Always wear protective headgear if participating in activities involving pressure or blows to the head.	Discuss the purpose and nature of the school's auditory screening program. The school nurse-teacher might serve as a resource person. List the sports requiring protective headgear. Under what circumstances should one never go swimming?	Many ears have been permanently damaged by amateurish "poking in the ear." Accumulations of wax or foreign objects should be removed from the ear by a physician so as to minimize damage to the delicate hearing mechanism. Many schools have conservation of hearing programs as part of their broader school health services program.
H. Pierced ear lobes	Ear piercing should be done under sterile conditions, preferable in a physician's office.	What dangers are involved in "do-it-yourself" ear piercing? Why is an infection in any part of the head serious?	
III. Other Senses	Some human senses are considered the "lower senses" because they lack the richness and variety of those for vision and hearing.		Continued research is being performed on the other senses.
A. Smell	The sense of smell is one of the most primitive senses.	What is the physiology of taste and smell? What factors must be present for us to smell? To taste?	The olfactory area contains the odor receptors. The olfactory area occupies only about 2.5 square centimeters in each nostril in humans.

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			The sense of smell has a more direct route to the brain than any other sense. The olfactory area is 40 times as large in a dog as in a human.
			We smell a full and rich variety of odors, but the exact mechanism is not fully understood.
		What are the various theories of smell and taste? How are they alike? Different?	One theory of how we smell is that it is due to a chemical reaction between the odorous substance and the odor receptors. Another theory is that some kind of radiation activity accounts for the sense of smell.
		Have students compose a list of situations in which the sense of smell could prove to be life-preserving. (Smelling of smoke or gases enabling a person to escape from a dangerous situation.)	Henning's smell prism classifies smells as spicy, burnt, resinous, flowery, foul, and fruity.
	Without a sense of smell there is a decreased efficienty in one's sense of taste.	Blindfold a student and have him hold his nose. Have him eat a piece of raw potato and a piece of apple. Can he identify the food? Why?	Another classification states that human beings can identify 16 odors.
			The absolute threshold of smell is designated by starting with a known concentration of the odorous substance and evaporating it into known volumes of air until the odor sensation is no longer elicited.

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B. Taste	Although taste is not absolutely essential for survival, it does contribute to a great deal of enjoyment during the act of eating that is essential for our survival.	How does taste enrich our lives? What effect does the sense of taste have on appetite?	
1. Tastebuds	The taste receptors are in the taste buds.		The taste buds are located on the tongue with a few in the soft palate, the pharynx, and the larynx. They are about 10,000 in number. Each taste bud has 10-15 taste cells on its tip. These taste cells constantly reproduce themselves. It is thought that there is a complete turnover of taste cells every 7 days. The first step in the taste process is assumed to be a chemical one. As with the sense of smell the exact mechanism is not known.
2. Primary taste sensations	The primary taste sensations are: sweet, sour, salty, bitter. Taste involves more than the primary taste sensations; other impressions involved in taste are temperature, touch, consistancy, and odor.	Discuss the primary taste sensations. What sensations are involved in eating a dish of ice cream? Why do some people like hot coffee, but dislike cold coffee?	It has been found that foods in thin solution have a sharper taste than thick ones. Hot foods have a stronger flavor than cold. Some sweet foods that are good cold are too sweet when hot. Meats are tastier when hot.

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3. Individual differences in acuity of taste and smell	People differ in their abilities to taste and to smell.	How does cigarette smoking affect taste? Smell? Appetite?	Smokers do not have as keen a taste as nonsmokers. Old people do not taste as keenly as young ones because the sensitivity of taste cells decreases with age.
		Review some of the literature on smoking. What are the conclusions of smoking regarding its effect of smoking on the ability to taste?	See Strand II - Smoking and Health. Absolute threshold for taste is designated as 1 teaspoon of sugar in 2 gallons of water.
C. Skin sensations	In ordinary life we feel a combination of the skin senses. The primary skin sensations are: touch pain, warm, and cold. The sense of touch is related to our sense of security. The skin's sensitive spots are unevenly distributed over the body's surface. There are some things that are learned only by the sense of touch.	Discuss: Where are the primary skin sensations located? How does each of these add to one's life? How is each a protective sense to the individual? See Strand III, Mental Health relative to the basic needs. Ask students to try and describe how sand feels without having felt it.	Skin sensations such as itch, tickle, quick-pricking pains, etc. are considered to be variations of the primary skin sensations. A baby needs to be held and fondled. In addition to emotional love, infants need this physical love and attention generally given to babies in order to help them to develop normally.

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1. Pressure	There are areas over the body called pressure spots that are more numerous in places where we are more likely to need a delicate sense of touch.	Conduct the following experiment: lightly press two pin points simultaneously to the surface of the skin at various points of the body. Gradually increase the distance between the points of the pins until they are felt as two separate stimuli. Compare how far the points must be spread on the back before they are felt separate with the distance they are spread on the fingertips.	Example? There are 135 pressure spots per square centimeter on the ball of the thumb but only about 10 in a square centimeter on the upper arm.
		Think of instances proving the phenomenon of adaptation. (Example: After putting our clothes on we lose the sense of pressure. We "forget" the feeling.)	Adaptation to pressure is a phenomenon where we stop sensing a pressure after a few seconds. The absolute threshold for pressure is designated as feeling the wing of a fly falling on the cheek from 1 centimeter away.
2. Pain	The sense of pain is important to survival because it is nature's way of warning us that something is wrong with our bodies. The receptors for pain are the free nerve endings	Have students compose a list of daily living activities in which the sense of pain could serve a protective function. (Cooking, ironing, etc.)	There are about 230 pain spots per square centimeter on the neck, 60 in the area of the same size on ball of the thumb, and 50 on the bottom of the foot.

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	found throughout the body and, as with the pressure spots, are unevenly distributed.		
3. Temperature	Because skin temperature is usually about 90° F., when an object with a temperature above or below 90° touches the body the person experiences it as warm or cold.	Experiment: Prepare three pails of water - hot, cold and room temperature. Put the right hand in the pail of hot water and the left hand in the pail of cold water and leave them for a few minutes. Then put both hands in the pail of water at room temperature. The water will feel warm to the "cold water hand" and cool to the "warm water hand."	This experiment demonstrates ability to adapt.
D. Kinesthesis	The kinesthetic sense informs us of the position and movement of parts of the body.	Have students extend their arms out from their sides and, alternating right and left hands, have them touch the tips of their noses with their index finger while their eyes are closed.	We could not manipulate ourselves without kinesthesis. We would have problems with walking, climbing, reaching, and grasping.

APPENDIX

SUNGLASSES

Jane A. MacCallum, Assistant in Vision Conservation

Many individuals can adjust to extremes of light without undue discomfort. However, to avoid headache and fatigue our eyes do need protection from glare during prolonged periods of exposure to sunlight.

The following statements* about sunglasses are offered to help clarify the many questions about their use and misuse.

1. Is bright sunlight harmful to the eyes?

   If one looks directly at the sun, as in eclipse observation, without proper protection (ordinary sunglasses are not sufficient) serious damage to the eyes can result. Rediations (reflected visible light and reflected ultraviolet light) may cause a painful condition of the eyes (snow blindness).

2. How much light can the human eye tolerate?

   Normally the eyes can adjust to fairly severe extremes in light. Photophobia (an inability to tolerate light) is often a sign that something is wrong. Ability to tolerate light varies with individuals.

3. Are all sunglasses alike?

   No.

4. Are there sunglasses which will eliminate headlight glare?

   No. Sunglasses should not be worn when driving in twilight or darkness.

5. Should sunglasses be worn for all summer outdoor activities?

   No. Sunglasses should be worn when protection against radiation from the sun is necessary.

Suggestions for Children Re: Sunglasses

1. The eyes should be protected by a broad-brimmed hat visor or sunglasses if bright light causes visual discomfort.
2. Extreme photophobia (inability to tolerate light) may be a sign that a child needs medical attention.
3. Constant use of sunglasses may limit one's ability to tolerate light.
4. Sunglasses for children should be nonshatterable and have strong, sturdy frames.
5. If in doubt about the need for sunglasses, consult your doctor.

*From report of "Subcommittee on Tinted Optical Media," American Academy of Ophthalmology and Otolaryngology and the American Medical Association.

MULTIMEDIA RESOURCES
Grades 7, 8, 9

Strand I Physical Health
Sensory Perception

TEACHER REFERENCES

These supplementary aids have not been evaluated. The list is appended for teacher convenience only and teachers in the field are requested to critically evaluate the materials and to forward their comments to the Curriculum Development Center.

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AUDIO-VISUAL AIDS

Films

All requests for the following films should be addressed to:

Film Library Supervisor
Office of Public Health Education
New York State Department of Health
84 Holland Avenue
Albany, New York 12208

Children of the Silent Night
Ear Protection in Noise
Eyes for Tomorrow
Glaucoma: Sneak Thief of Sight
Hearing: The Forgotten Sense
How the Ear Functions
How the Eye Functions
The Human Body: Sense Organs
The Human Skin
It Takes Two (ear protection in noise situations)
Silent World: Muffled World
Your Eyes

Other Sources

Ears and Hearing. Encyclopedia Brittanica Films.

Ears: Their Structure and Care. Coronet.

Eyes and Their Care. Encyclopedia Brittanica Films.

Gateways to the Mind. Encyclopedia Brittanica Films.

The Glass Wall. Vocational Rehabilitation Administration, Department of Health, Education and Welfare, Washington, D.C.

How the Eye Functions. Knowledge Builders, Visual Education Building, Floral Park, New York.

Johnny's New World. National Society for Prevention of Blindness, Inc., Public Information Dept., 16 East 40th Street, New York, New York.

Nose, Throat and Ears. McGraw-Hill.

You and Your Five Senses. Walt Disney Productions, 350 S. Buena Vista Street, Burbank, California.

SOURCES OF ADDITIONAL MATERIALS AND INFORMATION

American Board of Opthalmologists, Chairman, F. Newell, Chicago, Illinois, Secretary Treasurer, Francis Adler, 313 So. 17th Street, Philadelphia 19103

American Foundation for the Blind, 15W. 116th Street, New York, New York 10011

American Hearing Society, 919 18th Street, N.W. Washington, D.C. 20006

American Medical Association, 535 North Dearborn Street, Chicago, Illinois 60610. (pamphlets, posters, leaflets, books, and plaques).

American Optometric Association, Department of Public Affairs, 700 Chippewa Street, St. Louis, Missouri 63119

Bulletins of the National Society for the Prevention of Blindness, Inc., 79 Madison Avenue, New York, New York 10016

Metropolitan Life Insurance Company, Health and Welfare Division, 1 Madison Avenue, New York, New York 10010 (catalogs, exhibits, films, filmstrips, booklets for teachers, and health bulletins for teachers).

National Association of Hearing and Speech Agencies, 919 18th Street, N.W. Washington, D.C. 20006

National Institute of Health, Bethesda, Maryland

National Vision Institute, 630 Fifth Avenue, New York, New York 10020